TECHNICAL REVIEW COMMENTS
on the Environmental Impact Statement

Mosaic Potash
Colonsay Mine Expansion

Colonsay, Saskatchewan

Prepared by
Saskatchewan Ministry of Environment
Environmental Assessment Branch
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Preface

This document is provided by the Environmental Assessment Branch of Saskatchewan Ministry of Environment as supporting information for the public review of Mosaic Potash's Environmental Impact Statement for their proposed mine expansion near Colonsay, Saskatchewan.

This document has four major parts:

The first part provides an overview of the provincial environmental assessment and review process. It outlines the events and activities that led to the Environmental Impact Statement being released for public review and describes how the public can provide comments to the Minister of Saskatchewan's Ministry of Environment on Mosaic's proposed mine expansion.

The second part provides a brief summary of the development being proposed. This summary is intended to provide information to assist the reader in deciding whether they are interested in finding out more about the proposed development. It is not intended to be a full representation of the development. Interested readers should visit a review centre (see section 2 of this document for locations) to read the Environmental Impact Statement.

The third section of the document provides the Ministry of Environment's evaluation of the proponent's conclusions regarding the predicted impacts of the proposed project, the effectiveness of any identified mitigative measures and any follow-up requirements that would be placed on the proponent by the Minister, should the project be approved.

Section 4 presents the conclusions reached by the Ministry of Environment and again invites the public to comment. The Minister when making the final decision regarding the environmental acceptability of the proposed project considers both the public's comments and technical review comments.

1. Environmental Assessment and Review Process

Introduction

The Environmental Assessment Act (the Act) in Saskatchewan requires the proponents of a "development" to conduct an Environmental Impact Assessment (EIA). The EIA provides the information needed by the Minister responsible for the Act (Minister of Environment) to determine whether, from an environmental perspective, a proposed development should be allowed to proceed and, if so, under what conditions. As part of the environmental assessment process, the proponent is required to prepare an Environmental Impact Statement (EIS) that documents the developer's conclusions about the potential environmental effects of the proposed project. The EIS also describes the measures the proponent plans to take to reduce negative and enhance positive environmental impacts. Once completed, the EIS undergoes both a technical and public review prior to a decision being made by the Minister regarding the project.

The EA review process provides a broad understanding of the potential impacts and ways to minimize the impacts of a project.

The purpose of the environmental assessment and review process is to ensure that adequate environmental safeguards are in place before a development is allowed to proceed and that developments proceed in a manner understood and broadly accepted by the public. These safeguards may arise out of the actual design and nature of the proposed development or, should the development receive approval under the Act, terms and conditions of that approval, as well as ongoing regulatory involvement by government agencies.

For the current development, the primary environmental regulatory legislation for potash mines following The Environmental Assessment Act includes The Environmental Management and Protection Act, 2002 and regulations (The Mineral Industry Environmental Protection Regulations; The Water Regulations, 2002; Municipal Refuse Management Regulations; Hazardous Substances and Waste Dangerous Goods Regulations). Other federal and provincial agencies also have legislation and regulations that may be applicable.

Submission of the EIS

In May, 2009 Environmental Assessment Branch (EAB) received an environmental impact statement (EIS) from Mosaic for the proposed Colonsay expansion. Mosaic had not previously submitted a project proposal or requested project specific guidelines. Proponents are under no obligation to submit a proposal or develop project specific guidelines prior to submitting an EIS. The EIS was sent for technical review to provincial agencies and the Government of Canada.

Technical Review

Technical review provides the government perspective on the proposed development.

The EIS was reviewed by provincial and federal agencies to ensure that any potential environmental issues (including biophysical, social and economic) had been identified and adequately dealt with. The Final Technical Review Comments that you are reading have been prepared to assist the public and government decision-makers in their review of the EIS. The comments, starting on page 7, represent a summary of the provincial and federal government's evaluation of Mosaic's EIS.

In preparing technical review comments, the Ministry of Environment focuses on those factors that are considered to be of primary significance with respect to the proposed development and its environment.

Public Review

Public comment is invited on Mosaic's EIS for a period ending **Thursday, September 10, 2009**

The EIS, along with these Final Technical Review Comments, are being made available to the public for review at public libraries in Saskatoon and Regina; University libraries in Saskatoon and Regina; the Legislative Library in Regina; offices of the Town of Colonsay and the R.M. of Colonsay; and the Environmental Assessment Branch office in Regina; or it can be accessed on the internet at:

www.environment.gov.sk.ca/programs-services and then by following the links **Environmental Assessment/Notices/Section 11**

The public is invited to provide comments on the EIS by submitting them to Saskatchewan Environment **no later than Thursday, September 10, 2009** to the following address:

Ann Riemer
EA Development Project Administrator
Environmental Assessment Branch
Saskatchewan Ministry of Environment
Room 486, 3211 Albert Street
Regina SK S4S 5W6
Phone: 787-5793 Fax: 787-0930
Email: ann.riemer@gov.sk.ca
Please ensure mailed comments are postmarked no later than **Thursday, September 10, 2009.**

Ministerial Decision

The Minister considers both the public and technical review comments when making a decision.

Information generated during the public and technical reviews of the EIS will be submitted to the Minister of Saskatchewan Ministry of Environment for consideration. The Minister, under section 15 of The Environmental Assessment Act, may give Ministerial Approval to proceed with the development, with any terms and conditions that the Minister considers necessary or advisable, or the Minister may refuse to approve the development as proposed and will provide reasons for the decision.

2. Summary of Proposed Project

Information in this section is taken from Mosaic's EIS and is neither comprehensive nor inclusive of the information contained in that document. Please refer to the Executive Summary and the body of the EIS for more complete information.

Mosaic is one of the world's leading producers of potash and phosphate crop nutrients. The company operates four potash mines in Saskatchewan including the Colonsay conventional underground mine which began operations in 1969. The Colonsay mine is located approximately 9 km southeast of the Town of Colonsay in the R.M. of Colonsay. Currently, 428 people are employed at the Colonsay mine.

About 1.5 million tonnes/year of fertilizer (KCl) is currently produced at Colonsay using conventional mining techniques. The proposed development would see production increase in two phases to 1.72 million tonnes/year in 2009 and then to 2.27 million tonnes/year by 2012. The expansion is being proposed to provide additional product to meet the world-wide demand for fertilizer. To accommodate this increase the proposed expansion includes construction of new mill and facility upgrades; upgrades for additional hoisting and mining capacity; and provisions for an expanded tailings management area (TMA) covering approximately 384 hectares.

Colonsay is operated as a conventional underground mine that uses mining machines and room and pillar techniques to bring solid ore to the surface. The by-products of Colonsay consist of salt (NaCl), clays (fine tailings) and brine. Coarse salt and fine tailings are separated from the potash in the mill and deposited in the TMA, where they are stored within containment dykes. Brine is circulated in the TMA for re-use in the mill and excess brine is disposed of by deep well injection.

Alternatives Considered

The site for the new TMA was evaluated based on the best geometry for the future tailings pile, existing infrastructure, and current land ownership. Geology and hydrogeology were not large factors in determining the location of the proposed new TMA since the site is favorable and consistent for the area. The new coarse tailings area is proposed for west of the existing pile to avoid existing mine infrastructure to the east and unfavorable geometry to the north or south. The latter would have created a long, narrow pile that limits the opportunity for benching and therefore limits pile height. Moving coarse tailings west allows for benching and ultimately a high pile that optimizes the footprint.

The future fine tailings disposal areas are proposed for north of the existing TMA. Fine tailings are currently not stackable and must be contained within the dykes, perimeter ditches and future French drains to restrict subsurface brine migration. However, engineering studies are currently in progress to evaluate the ability to drain the fine tailings and eventually stack them above the height of the dykes using an alternative storage technology.

Mosaic evaluated several approaches to containment for the proposed TMA areas. "A compacted clay and/or HDPE liners are often used in pond construction for containment. This type of lining system is not recommended for the new tailings management area due to the associated cost and high likelihood of failure during the lifetime of the TMA. A compacted till and/or plastic liner is not suitable for the TMA since a significant amount of settlement caused by tailings pile loading will likely compromise the liner. A plastic liner will also limit the height of a tailings pile as it introduces a preferential slip plane below the tailings pile. Rather than limit storage and construct a liner that may not function for the life of the facility, it is recommended that active perimeter containment be implemented" consisting of containment dykes, perimeter ditches and a French drain for containment of lateral brine migration.

Social and Economic Impacts Considered

The proposed expansion is not anticipated to have significant adverse social or economic impacts. Two gravel R.M. roads used by local landowners and mine personnel will be taken out of service due to the expansion. Mosaic is in discussion with the R.M. to determine the required action (new roads may be constructed).

The expansion will provide for an additional 150 full-time employees in addition to 550 person years of construction labour. Local communities and businesses should benefit economically from the new families moving into the area as well as from the shorter term construction activities. There are no plans to build an on-site camp to house construction workers.

Environmental Impacts Considered

Many potential environmental impacts were considered in the EIS; however only the more significant ones are highlighted below. For a more comprehensive summary of impacts and mitigation proposed see Tables 8.1 and 8.3 and the Commitments Register in the Colonsay EIS.

Expansion of the TMA will result in approximately 390 ha of farmland (including wetlands) being taken out of production for the foreseeable future. Following decommissioning of the mine after the expected mine life of 79 years and long term dissolution of the salt pile, the land will, if possible be reclaimed to its former use.

Approximately 41 hectares of ephemeral and permanent wetlands are located within the proposed expansion area. Mosaic has acknowledged that where wetlands cannot be avoided, mitigation for lost wetlands may include conservation easements or enhancements for existing wetlands or the creation of wetlands at other locations within the vicinity of the mine site to help maintain the form and function of the regional landscape.

Mosaic will utilize more fresh water on an annual basis as a result of the expansion; however, they will use less water per tonne of product produced and will not require an increase in their licenced annual water allocation.

Brine migration from the TMA is a significant potential environmental impact of the proposed expansion. The containment system for the new TMA involves perimeter dykes, a perimeter composite drain (French drain with relief wells) and seepage interceptor ditches designed to limit the potential for subsurface migration. Contaminant Transport Modelling indicates that the French drain system reduces downstream lateral brine migration (see Appendix B – 20 and 100 year simulations in Figs. 5-6 to 5-11). "In addition, a helicopter electromagnetic (HEM) survey was performed in 2008. Data was collected at several different frequencies in order to map geology and evaluate potential brine movement at different intervals of depth. The interpretation of the airborne EM is currently underway."

Monitoring of groundwater levels and geochemistry is done on an annual basis at forty monitoring wells and 24 surface water stations around the site. Some wells and surface water sites may be decommissioned due to their location relative to the expansion, but additional ones will be added to compensate. Additional groundwater monitoring wells will be installed as required to monitor the performance of control structures around the new TMA.

Subsidence (lowering of elevation) of the landscape overlaying underground potash mining can be detected 1 to 2 years after mining and at rates that tend to decrease over time. At Colonsay, surveys are conducted every two years using

conventional levelling methods (Section 8.1.8 of the EIS). Monitoring using Light Distance and Ranging (LiDAR) has been used once and its effectiveness is being evaluated. A maximum subsidence of 0.55 m has been measured in an area that commenced mining in the early 1970's. Mosaic expects a maximum of approximately 0.85 m of subsidence over mined out areas over time. To date there have been no reports of damage or remedial measures taken at the site due to subsidence. Mosaic does not expect drainage patterns to be altered by subsidence.

Additional detail regarding measures to address these and other anticipated impacts can be found in the EIS.

Public Consultation Feedback and Response

Reaction at the open house on November 13, 2008 was generally favorable. Some comments/questions related to business opportunities, potential for subsidence and interest in seeing the monitoring plan for the expansion. Section 6 and Appendix I of the EIS provide an overview of the issues and questions raised through RM and public meetings with Mosaic.

3. Technical Review Comments

Introduction

The intent of the technical review step of the environmental assessment and review process is to give provincial and federal specialists/agencies an opportunity to examine the EIS to:

- Develop their opinions about how adequately the environmental issues related to the development have been dealt with; and
- Determine whether the information provided is sufficiently complete and technically accurate enough to support the public review phase of the process.

Release of the EIS for public review should not be interpreted as absolute agreement with all items within the EIS, but simply that the issues remaining can be handled through ongoing regulatory relationships or terms and conditions that might flow from a decision made pursuant to The Environmental Assessment Act that would modify the "development" to make it acceptable to the technical reviewers.

The comments of the technical reviewers are summarized in the following sections.

Biophysical Considerations

Water and Soil

Containment of the brine in the TMA will consist of perimeter dykes, interception ditches, and French drains. The report proposes the construction of French drains downstream at 8 meters below ground at the proposed TMA to reduce downstream lateral migration. While reviewers agree with the findings that the construction of containment structures would be effective in minimizing any impacts to existing groundwater resources, they have some concern that the oxidized till may be deeper than 8 meters. Further analysis should be carried out to determine the optimal depth for the French drains to contain lateral migration of brine. The proposed future monitoring will demonstrate the effectiveness of the system. Results of the 2008 helicopter electromagnetic (HEM) survey would also be very helpful in examining the current effectiveness of containment at the site.

Excess brine is injected into the Deadwood aquifer, a non-potable water source, for disposal. There is some question about the ongoing capacity of the Deadwood to accept waste materials. The proponent states that the "limiting factor of injection capacity is the current pumping equipment, not the injection wells." Reviewers would like to know how Mosaic arrived at this conclusion; i.e., what is the bearing capacity of the Deadwood. Mosaic states in its EIS that it has committed to participate in industry shared research regarding the long-term sustainability of deep well injection. Mosaic should describe in more detail what they are doing to assess the capacity of the formation.

The proponent is expected to provide SWA with plans of the proposed drainage works in the areas to the north and west of the expansion so that they can assess the need for filing applications for the construction and operation of the works.

Environment Canada would like to bring to the proponent's attention that the proper design of a diversion channel around the TMA will require an estimation of the flooding flow rate. Appropriate design of the flood\ diversion channel around the perimeter of the facility could prevent potential surface runoff contamination downstream to the Qu'Appelle River.

The proposed expansion at the Colonsay mine will result in an increase in fresh water use, but it is still within the mine's current allocation. Mosaic has identified a reduction per tonne in water use by the implementation of phase II. Reviewers encourage Mosaic to continue to explore technologies for reducing fresh water consumption including the use of brackish or saline water.

Wetlands

Forty one hectares of ephemeral and permanent wetlands occur within the proposed TMA expansion area. Due to the importance of wetlands to wildlife and water processes, reviewers agree with the findings in the EIS that mitigation for the loss of these wetlands in the form of construction of new wetlands or enhancement of existing ones is important.

Reviewers remind the proponent that work around migratory bird habitat (wetlands in this circumstance) needs to be conducted according to the provincial activity restriction guidelines or a second survey just prior to construction needs to be conducted to ensure no nesting species are disturbed.

Subsidence

Subsidence monitoring at the Colonsay site has detected up to a 0.55 m drop in elevation. Reviewers suggest that additional studies be carried out in the future by the potash industry and others to assess the potential impact of subsidence on linear structures (e.g., gas lines, rail roads and highways) and on surface and ground water flow.

Heritage Resources

A Heritage Resources Impact Assessment was conducted for the study area. The report has not yet been submitted to Heritage Branch; however based on the report in the EIS, reviewers feel any heritage requirements have been met. Minor changes to the heritage requirements may be made once the report is formally submitted to Heritage Branch.

Infrastructure

Reviewers would like to remind the proponent that the Minister of Highways and Infrastructure (HI) has final authority on all road closures including R.M. roads. Thus, the R.M. would initially approve the two closures and submit that approval to the HI Minster, for final approval. Ownership of roadways is with the crown and the administration and control of the roadway area is with the R.M. of Colonsay.

The Ministry provides a checklist to Rural Municipalities describing the process to follow if they proceed with the permanent closure of the roadway. The Ministry contact for rural closure is Peter Gennutt (306)787-4045.

Reviewers also note that there are two easements; a CNR right-of-way in SW 28 and a water pipe line in Section 20 belonging to SaskWater. Both CN and SaskWater should be contacted in this regard.

4. Conclusion

The Saskatchewan Environmental Assessment Review Panel (technical reviewers) and Saskatchewan Ministry of Environment conclude that Mosaic has undertaken sufficient studies and provided adequate information about the proposed Colonsay potash mine expansion such that the EIS can be made available for public review.

The main concerns/issues identified during the technical review related to:

- Waste brine management and potential effects on water and soil;
- Potential impacts of subsidence on linear features and water flow patterns; and
- Loss of wetlands.

Invitation to Comment

The public is invited to review Mosaic's EIS and the Technical Review Comments and to provide their comments, no later than **Thursday, September 10, 2009** regarding the EIS.

Again, the EIS along with these Final Technical Review Comments, are being made available to the public for review at public libraries in Saskatoon and Regina; the University libraries in Saskatoon and Regina; the Legislative Library in Regina; the offices of the Town of Colonsay and the R.M. of Colonsay and the Environmental Assessment Branch office in Regina; or it can be accessed on the internet at:

www.environment.gov.sk.ca/programs-services and then by following the links **Environmental Assessment/Notices/Section 11**

The comments received during the public review of the EIS along with the technical review comments will be considered by the Minister of Environment when making a decision (under section 15(1) of The Environmental Assessment Act) to either:

(a) give ministerial approval to proceed with the development and impose any terms and conditions that he considers necessary or advisable; or
(b) refuse to approve the development.

Contact

For more information, please contact:

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